

CLAIMS

1. A lighting device for a discharge lamp comprising:

an HF power source device for generating HF voltage with a prescribed frequency; and

an external electrode type dielectric barrier discharge lamp using rare gas as a discharge medium, which is supplied with the HF voltage from the HF power source device,

wherein the external electrode type florescent lamp having a gas pressure of equal to or higher than 120 torr and the frequency of the HF voltage is in the range from 24 kHz to 34 kHz.

2. A lighting device for a discharge lamp according to claim 1, wherein the HF power source device is further comprising:

a light control signal generating circuit;

a circuit for generating a drive signal with a first frequency selected from 24 kHz to 34 kHz range and a drive signal with a second frequency selected from 20 kHz to 24 kHz range, each of which is modulated in pulse width by the output signal of the light control signal generating circuit;

a light control ratio judge circuit to which the output of the light control signal generating circuit

is supplied;

a drive signal selection switch which selectively provides the drive signal of the first frequency or the drive signal of the second frequency by the output signal of the light control ratio judge circuit;

a switching element driven by the drive signal of the first or the second frequency selected by the drive signal selection switch; and

a transformer having a primary coil connected with the switching element and a secondary coil connected with the external electrode type dielectric barrier discharge lamp,

wherein the drive signal selecting switch selects the drive signal of the first frequency when the light control ratio judged by the light control ratio judge circuit is equal to or higher than a prescribed value and selects the drive signal of the second frequency when the light control ratio is equal to or lower than a prescribed value, supplying the selected drive signal to the switching element.

3. A lighting device for a discharge lamp according to claim 2, wherein the circuit generating the drive signals further comprises:

a first drive signal generating circuit for generating the drive signal of the first frequency; and

a second drive signal generating circuit for generating the drive signal of the second frequency, and wherein the first and second drive signal generating circuits generate the drive signals having substantially a same frequency and inverted phases.

4. A lighting device for a discharge lamp according to claim 3, wherein the switching elements are a first and a second semiconductor switching elements connected in series between a DC power source and a ground and the first and the second semiconductor switching elements are in alternating ON/OFF states controlled by the output pulse signals of the first and the second drive signal generating circuit.

5. A lighting device for a discharge lamp according to claim 4, wherein one end of the primary coil of the transformer is connected with the connecting point of a first and a second capacitors connected in series between the DC power source and the ground and the other end of the primary coil is connected with the connecting point of the first and the second semiconductor switching elements connected in series.

6. A lighting device for a discharge lamp according to claim 5, wherein the prescribed value of the light control ratio is about 25%.

7. A lighting device for a discharge lamp

according to claim 2, wherein the rare gas enclosed in the external electrode dielectric barrier discharge lamp contains xenon, neon and argon, but does not contain mercury.

8. A lighting device for a discharge lamp according to claim 7, wherein the external electrode type fluorescent lamp comprises a glass tube inside which the rare gas is enclosed, a phosphor applied on the inner wall of the glass tube, an inner electrode sealed in one end of the glass tube through a lead-in wire, and an external electrode made of electricity conducting material provided on the outer wall of the glass tube along the tube axis.

9. A lighting device for a discharge lamp according to claim 8, wherein the external electrode is an electricity conducting wire wound spirally around the outer wall of the glass tube.

10. A lighting device for a discharge lamp comprising:

- a light control signal generating circuit;

- a circuit for generating a drive signal of a first frequency selected from a range from 24 kHz to 34 kHz and a drive signal selected from a range from 20 kHz to 24 kHz, which are modulated in pulse width by the output signal of the light control signal generating circuit;

a light control ratio judge circuit, which is provided with the output signal of the light control signal generating circuit;

a drive signal selection switch, which selects either one of the drive signal of the first frequency and the drive signal of the second frequency;

a switching element, which is driven by the drive signal of the first or the second frequency selected by the drive signal selection switch; and

a transformer having a primary coil, to which the switching element is connected and a secondary coil, to which an external electrode type dielectric barrier discharge lamp is connected,

wherein the drive signal selection switch selects the drive signal of the first frequency when the light control ratio judged by the light control ratio judge circuit is higher than or equal to the prescribed value, and selects the drive signal of the second frequency when the light control ratio judged by the light control ratio judge circuit is lower than or equal to the prescribed value, supplying the drive signal thus selected to the switching element.

11. A lighting device for a discharge lamp according to claim 10, wherein the circuit for generating the drive signal is provided with a first drive signal generating circuit for generating the

drive signal of the first frequency and a second drive signal generating circuit for generating the drive signal of the second frequency, and wherein the first and second drive signal generating circuits generate the drive signals having substantially a same frequency and inverted phases.

12. A lighting device for a discharge lamp according to claim 11, wherein the switching elements are a first and a second semiconductor switching elements which are connected in series between the DC power source and the ground, and each of the semiconductor switching elements is controlled ON/OFF by the pulse signals of the first and the second drive signal generating circuits.

13. A lighting device for a discharge lamp according to claim 12, wherein one end of the primary coil of the transformer is connected with the connecting point of a first and a second capacitors which are connected in series between the DC power source and the ground, the other end of the primary coil is connected with the connecting point of the first and the second semiconductor switching elements connected in series.

14. A lighting device for a discharge lamp according to claim 13, wherein the prescribed value of the light control ratio is about 25%.

15. A lighting device for a discharge lamp according to claim 14, wherein the rare gas enclosed in the external electrode type dielectric barrier discharge fluorescent lamp contains xenon, neon, and argon, but does not contain mercury.

16. A lighting device for a discharge lamp according to claim 15, wherein the external electrode type dielectric barrier discharge lamp comprises a glass tube in which a rare gas is enclosed, a phosphor applied on the inner wall of the glass tube, an inner electrode sealed in one end of the glass tube through a lead-in wire, and an external electrode made of electricity conducting material provided on the outer wall of the glass tube along the tube axis.

17. A lighting device for a discharge lamp according to claim 16, wherein the external electrode is an electricity conducting wire wound spirally around the outer wall of the glass tube.

18. A lighting device for a discharge lamp comprising:

- an HF power source device for generating HF pulse voltage;

- an external electrode type dielectric barrier discharge lamp which is supplied with the HF pulse voltage from the HF power source device and is enclosed with rare gas of 120 torr or higher pressure as a

discharge medium; and

a means for modulating the HF pulse voltage from the HF power source by a light control information used for luminance control of the discharge lamp,

wherein the HF power source device controls to decrease the drive frequency of the discharge lamp when the light control information indicates a low light control ratio range, in which flickering in the luminance of the discharge lamp is seen, and to increase the drive frequency of the discharge lamp when the light control information indicates a high light control ratio range, in which flickering is not seen.

19. A lighting device for a discharge lamp according to claim 18, wherein the low light control ratio range in which the flickering of the discharge lamp is seen is lower than 25%, the high light control ratio range in which the flickering is not seen is higher than 25%.

20. A lighting device for a discharge lamp according to claim 19, wherein the drive frequency of the discharge lamp is in the range from 24 kHz to 34 kHz when the light control ratio is higher than 25%, and the frequency is in the range from 20 kHz to 24 kHz when the light control ratio is lower than 25%.